

What is claimed is:

1 1. A constant current circuit including a plurality of resistors
2 formed on a semiconductor substrate, comprising:
3 a first current source for producing a first current of constant
4 magnitude regardless of resistance variations which can occur uniformly in
5 said resistors; and
6 a second current source for producing a second current of magnitude
7 which is inversely variable with said resistance variations,
8 said first and second current sources being connected to each other for
9 producing an output current which is equal to a difference between said first
10 and second currents.

1 2. The constant current circuit of claim 1, wherein said second
2 current is variable depending on an base-emitter voltage of a transistor.

1 3. The constant current circuit of claim 1, wherein said second
2 current is variable depending on a power-line voltage.

1 4. The constant current circuit of claim 1, wherein said second
2 current source is a band-gap type constant current source.

1 5. A constant current circuit including a plurality of resistors
2 formed on a semiconductor substrate, comprising:
3 a first group of parallel transistors having emitters connected via
4 respective resistors to a voltage source and having collectors connected
5 together to an output terminal;

6 a second group of parallel transistors having emitters connected via
7 respective resistors to said voltage source and having collectors connected to
8 each other;

9 a constant current source connected between the collectors of said
10 second group of transistors and ground to produce a constant current, said
11 first and second groups of transistors having bases connected together to
12 form a current mirror, whereby a current equal to said constant current is
13 drawn by said first group of transistors to said output terminal; and
14 transistor-resistor circuitry for drawing a current inversely variable
15 with uniform resistance variations of said semiconductor substrate from said
16 output terminal to ground.

1 6. The constant current circuit of claim 5, wherein said transistor-
2 resistor circuitry comprises:

3 at least one third transistor having an emitter connected via a resistor
4 to said voltage source and a collector connected to a circuit node, whereby a
5 current whose magnitude is equal to $1/M$ of said constant current is drawn
6 by said third transistor to said circuit node, where M is the number of
7 transistors provided in each of said first and second groups of transistors;
8 a fourth transistor having a collector connected to said output terminal
9 and an emitter connected to ground via a resistor, said fourth transistor
10 having a base electrode connected to said circuit node; and
11 a fifth transistor having a collector connected to said circuit node and
12 an emitter connected to ground via a resistor, said fifth transistor having a
13 base electrode connected to the emitter of said fourth transistor.

1 7. The constant current circuit of claim 5, wherein said transistor-

2 resistor circuitry comprises:

3 a pair of resistors connected in series between said voltage source and
4 ground to form a circuit node therebetween; and

5 a third transistor having a collector connected to said output terminal
6 and an emitter connected to ground via a resistor, said third transistor having
7 a base electrode connected to said circuit node.

1 8. The constant current circuit of claim 5, wherein said transistor-
2 resistor circuitry comprises:

3 third and fourth transistors having emitters connected via respective
4 resistors to said voltage source and having bases connected together to the
5 bases of said first and second groups of transistors to produce from each of
6 the third and fourth transistors a current whose magnitude is equal to $1/M$ of
7 said constant current, where M is the number of transistors provided in each
8 of said first and second groups of transistors;

9 a group of fifth transistors having collectors connected together to the
10 collector of said third transistor, having emitters connected together to
11 ground through a series-connected resistors to ground and having bases
12 connected to a first circuit node to which collector of said fourth transistor is
13 connected;

14 a sixth transistor having a collector and a base electrode connected
15 together to said first circuit node and having an emitter connected to a second
16 circuit node formed between said series-connected resistors; and

17 a seventh transistor having a collector connected to said output
18 terminal and an emitter connected to ground via a resistor and having a base
19 electrode connected to said first circuit node.

1 9. An active filter circuit having a plurality of resistors formed on
2 a semiconductor substrate, comprising:
3 a first current source for producing a first current of constant
4 magnitude regardless of resistance variations which can occur uniformly in
5 said resistors;
6 a second current source for producing a second current of magnitude
7 which is inversely variable with said resistance variations, said first and
8 second current sources being connected to each other for producing an
9 output current which is equal to a difference between said first and second
10 currents; and
11 an active filter driven by said output current for filtering an input
12 signal.

1 10. The active filter circuit of claim 9, wherein said active filter is a
2 low-pass filter.

1 11. The active filter circuit of claim 9, wherein said active filter
2 comprises:
3 a pair of switching circuits driven by said output current, said
4 switching circuits alternately assuming a conducting state according to
5 polarity of an input signal applied thereto; and
6 resistor-capacitor circuitry connected across said switching circuits to
7 produce an output signal.

1 12. The active filter circuit of claim 9, wherein said second current
2 is variable depending on an base-emitter voltage of a transistor.

1 13. The active filter circuit of claim 9, wherein said second current
2 is variable depending on a power-line voltage.

1 14. The active filter circuit of claim 9, wherein said second current
2 source is a band-gap type constant current source.

1 15. An active filter circuit having a plurality of resistors formed on
2 a semiconductor substrate, comprising:
3 a first group of parallel transistors having emitters connected via
4 respective resistors to a voltage source and having collectors connected
5 together to an output terminal;
6 a second group of parallel transistors having emitters connected via
7 respective resistors to said voltage source and having collectors connected to
8 each other;
9 a constant current source connected between the collectors of said
10 second group of transistors and ground to produce a constant current, said
11 first and second groups of transistors having bases connected together to
12 form a current mirror, whereby a current equal to said constant current is
13 drawn by said first group of transistors to said output terminal; and
14 transistor-resistor circuitry for drawing a current inversely variable
15 with uniform resistance variations of said semiconductor substrate from said
16 output terminal to ground;
17 a pair of switching circuits driven by said output current, said
18 switching circuits alternately assuming a conducting state according to
19 polarity of an input signal applied thereto; and
20 resistor-capacitor circuitry connected across said switching circuits to
21 produce an output signal.

1 16. The active filter circuit of claim 15, wherein one of said
2 switching circuits comprises a first transistor and a second transistor
3 connected in series between said voltage source and ground, and the other
4 switching circuit comprises a third transistor and a fourth transistor
5 connected in series between said voltage source and ground,
6 said first and third transistors having bases connected together to
7 receive said output current, and said second and fourth transistor connected
8 to a pair of input terminals to which said input signal is applied,
9 wherein said resistor-capacitor circuitry comprises:
10 a resistor connected between collectors of said first and third
11 transistors; and
12 a capacitor connected between collectors of said second and fourth
13 transistors for producing said output signal.

1 17. The active filter circuit of claim 15, wherein said transistor-
2 resistor circuitry comprises:
3 at least one third transistor having an emitter connected via a resistor
4 to said voltage source and a collector connected to a circuit node, whereby a
5 current whose magnitude is equal to $1/M$ of said constant current is drawn
6 by said third transistor to said circuit node, where M is the number of
7 transistors provided in each of said first and second groups of transistors;
8 a fourth transistor having a collector connected to said output terminal
9 and an emitter connected to ground via a resistor, said fourth transistor
10 having a base electrode connected to said circuit node; and
11 a fifth transistor having a collector connected to said circuit node and
12 an emitter connected to ground via a resistor, said fifth transistor having a
13 base electrode connected to the emitter of said fourth transistor.

1 18. The active filter circuit of claim 15, wherein said transistor-
2 resistor circuitry comprises:
3 a pair of resistors connected in series between said voltage source and
4 ground to form a circuit node therebetween; and
5 a third transistor having a collector connected to said output terminal
6 and an emitter connected to ground via a resistor, said third transistor having
7 a base electrode connected to said circuit node.

1 19. The active filter circuit of claim 15, wherein said transistor-
2 resistor circuitry comprises:
3 third and fourth transistors having emitters connected via respective
4 resistors to said voltage source and having bases connected together to the
5 bases of said first and second groups of transistors to produce from each of
6 the third and fourth transistors a current whose magnitude is equal to $1/M$ of
7 said constant current, where M is the number of transistors provided in each
8 of said first and second groups of transistors;
9 a group of fifth transistors having collectors connected together to the
10 collector of said third transistor, having emitters connected together to
11 ground through a series-connected resistors to ground and having bases
12 connected to a first circuit node to which collector of said fourth transistor is
13 connected;
14 a sixth transistor having a collector and a base electrode connected
15 together to said first circuit node and having an emitter connected to a second
16 circuit node formed between said series-connected resistors; and
17 a seventh transistor having a collector connected to said output
18 terminal and an emitter connected to ground via a resistor and having a base
19 electrode connected to said first circuit node.